Entergy

**Entergy Nuclear Operations, Inc.**
Pilgrim Nuclear Power Station
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Plymouth, MA 02360

**Peter J. Miner**
Manager, Regulatory Assurance

Letter Number 2.18.068

November 29, 2018

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Licensee Event Report 2018-006-00, Automatic Reactor Scram Due to Feedwater Regulating Valve Malfunction

Pilgrim Nuclear Power Station
Docket No. 50-293
Renewed License No. DPR-35

Dear Sir or Madam:

The enclosed Licensee Event Report 2018-006-00, Automatic Reactor Scram Due to Feedwater Regulating Valve Malfunction, is submitted in accordance with Title 10 Code of Federal Regulations 50.73.

If you have any questions or require additional information, please contact me at (508) 830-7127.

There are no regulatory commitments contained in this letter.

Sincerely,

PJM/rm

Attachment 1: Licensee Event Report 2018-006-00, Automatic Reactor Scram Due to Feedwater Regulating Valve Malfunction

IE22
NRR

cc: Mr. David C. Lew
Regional Administrator, Region I
U. S. Nuclear Regulatory Commission
2100 Renaissance Boulevard, Suite 100
King of Prussia, PA 19406-2713

Mr. John Lamb, Senior Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop 9 D12
Washington, DC 20555-0001

NRC Senior Resident Inspector
Pilgrim Nuclear Power Station

**Attachment 1**

Letter Number 2.18.068

Licensee Event Report 2018-006-00, Automatic Reactor Scram Due to Feedwater Regulating Valve Malfunction

(3 Pages)

8NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

# LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)



| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
| Pilgrim Nuclear Power Station | 05000-293 | 1 OF 3 |

4. TITLE Automatic Reactor Scram Due to Feedwater Regulating Valve Malfunction

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO. | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | N/A | N/A |
| 10 | 05 | 2018 | 2018 | - 006 | - 00 | 11 | 29 | 2018 | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | N/A | N/A |

| 9. OPERATING MODE | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)* | | | |
|---|---|---|---|---|
| N | ☐ 20.2201(b) | ☐ 20.2203(a)(3)(i) | ☐ 50.73(a)(2)(ii)(A) | ☐ 50.73(a)(2)(viii)(A) |
| | ☐ 20.2201(d) | ☐ 20.2203(a)(3)(ii) | ☐ 50.73(a)(2)(ii)(B) | ☐ 50.73(a)(2)(viii)(B) |
| | ☐ 20.2203(a)(1) | ☐ 20.2203(a)(4) | ☐ 50.73(a)(2)(iii) | ☐ 50.73(a)(2)(ix)(A) |
| | ☐ 20.2203(a)(2)(i) | ☐ 50.36(c)(1)(i)(A) | ☒ 50.73(a)(2)(iv)(A) | ☐ 50.73(a)(2)(x) |
| 10. POWER LEVEL | ☐ 20.2203(a)(2)(ii) | ☐ 50.36(c)(1)(ii)(A) | ☐ 50.73(a)(2)(v)(A) | ☐ 73.71(a)(4) |
| 100 | ☐ 20.2203(a)(2)(iii) | ☐ 50.36(c)(2) | ☐ 50.73(a)(2)(v)(B) | ☐ 73.71(a)(5) |
| | ☐ 20.2203(a)(2)(iv) | ☐ 50.46(a)(3)(ii) | ☐ 50.73(a)(2)(v)(C) | ☐ 73.77(a)(1) |
| | ☐ 20.2203(a)(2)(v) | ☐ 50.73(a)(2)(i)(A) | ☐ 50.73(a)(2)(v)(D) | ☐ 73.77(a)(2)(i) |
| | ☐ 20.2203(a)(2)(vi) | ☐ 50.73(a)(2)(i)(B) | ☐ 50.73(a)(2)(vii) | ☐ 73.77(a)(2)(ii) |
| | | ☐ 50.73(a)(2)(i)(C) | ☐ OTHER Specify in Abstract below or in NRC Form 366A | |

12. LICENSEE CONTACT FOR THIS LER

| LICENSEE CONTACT | TELEPHONE NUMBER *(Include Area Code)* |
|---|---|
| Mr. Peter J. Miner - Regulatory Assurance Manager | 508-830-7127 |

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| X | SJ | FCV | C635 | Y | | | | | |

| 14. SUPPLEMENTAL REPORT EXPECTED | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|---|
| ☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO | | | | |

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On October 5, 2018 at 1209 hours, with the reactor operating at 100% power, an automatic reactor scram occurred due to a reactor water level perturbation and receipt of a low reactor water level Reactor Protection System signal caused by a malfunction of the 'A' Feedwater Regulating Valve (FRV).

The Failure Modes Analysis attributed the probable cause to be an intermittent signal in the stepper motor and encoder control loop, which is the system that manipulates the pneumatic spool to operate the FRV's Double-Acting Piston Actuator. The as-found condition of the stepper motor and encoder electrical connectors showed that several pin sockets were not properly seated within their connector housings. Proper seating of the FRV stepper motor and encoder electrical connections is critical in ensuring error free operation of the FRVs.

There were no radiological releases due to this event. All control rods inserted fully. All other plant systems responded as designed. This event had no impact on the health and/or safety of the public.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A).

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. LER NUMBER | | |
|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REV NO. |
| Pilgrim Nuclear Power Station | 05000- 293 | 2018 | - 006 | - 00 |

NARRATIVE

## BACKGROUND

The purpose of the Feedwater Level Control system (FWLC) is to automatically control feedwater flow to the reactor vessel, maintaining reactor vessel water level within a specified range during all operating modes. FWLC instrumentation measures reactor vessel water level, total feedwater flowrate and total steam flowrate. During automatic operation, these three measurements are used to control feedwater flow.

The ability to maintain vessel level within a specified range during load changes is accomplished by the three-element control signal. The total steam flow signal and the total feedwater flow signal are fed into a proportional amplifier. The output from this amplifier is the mismatch between the input signals (steam flow-feedwater flow error signal). If steam flow is greater than feedwater flow, the amplifier output is increased from its normal value, causing the system to increase feed flow to balance with steam flow. This amplifier output is fed to a second proportional amplifier that also receives a reactor vessel water level signal. Adding the reactor vessel water level signal to the steam flow-feedwater flow error signal results in a three-element control signal, which is fed to the level controller.

## EVENT DESCRIPTION

On October 5, 2018 at 1209 hours with the reactor operating at 100% power, Pilgrim Nuclear Power Station automatically scrammed due to a reactor water level perturbation and receipt of a low reactor water level Reactor Protection System (RPS) signal. Investigation revealed a sudden increase in loop 'B' feedwater flow with a subsequent rapid decrease in loop 'A' feedwater flow. The flow perturbation resulted from closure of the 'A' Feedwater Regulating Valve (FRV), FV-642A. The 'B' FRV, FV-642B, responded properly by initially reducing flow then increasing flow to compensate. Feedwater flow through loop 'B' was not able to maintain reactor water level. An automatic reactor scram occurred due to receipt of a low reactor water level RPS signal. All control rods inserted fully.

## CAUSE OF THE EVENT

The Failure Modes Analysis attributed the probable cause to be an intermittent signal in the stepper motor and encoder control loop, which is the system that manipulates the pneumatic spool to operate the FRV's Double-Acting Piston Actuator. The as-found condition of the stepper motor and encoder electrical connectors showed that several pin sockets were not properly seated within their connector housings. Proper seating of the FRV stepper motor and encoder electrical connections is critical in ensuring error free operation of the FRVs.

## CORRECTIVE ACTIONS

The entire pneumatic module which includes the stepper motor, encoder, and air spool, the associated connectors, and the stepper motor driver board were replaced on FV-642A. Post Work Testing, calibration, valve stroke and configuration review were completed satisfactorily demonstrating proper operation of the replacement components. Since these failure modes could be applicable to the FRV in the other train, the station proactively replaced the same components on FV-642B.

SAFETY CONSEQUENCES

The actual consequence was an automatic reactor scram due to low reactor water level, which resulted from loss of ability to control FRV, FV-642A. All control rods inserted fully. All other plant systems responded as designed.

There were no other actual consequences to safety of the general public, nuclear safety, industrial safety, and radiological safety for this event.

REPORTABILITY

This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A), Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section including 50.73(a)(2)(iv)(B)(1), Reactor Protection System.

PREVIOUS EVENTS

LER 2016-007-00, Manual Reactor Trip Due To Feedwater Regulating Valve Malfunction

REFERENCES

CR-PNP-2018-07927